

# **ECONOMETRICS I (INTERMEDIATE LEVEL)**

Number of credits: 4 ECTS

Course period: 2d (half) semester / 4 classes (2 lectures + 2 seminars) per week,

Language of Instruction: English

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## **Course description**

This course is the first part in the Econometrics sequence. The aim of the course is to introduce the methodology used in applied empirical research. By the end of the course, students should be able to distinguish different econometric methods, know when each method may be applied and how to apply this method in empirical research. Lectures will be accompanied with practical exercise sessions in computer lab to assure the understanding of theoretical concepts and to provide the guidance for using these concepts in applied research. Primary software used during the course is Stata and Eviews.

## **Prerequisites**

Mathematical statistics, Probability theory

## **Course evaluation**

Grading is based on class attendance and participation (10%), two home assignments (10% each), a midterm exam (20%), and a cumulative final exam (50%).

## **Assignments**

Home assignments contain empirical and theoretical parts and should serve as a preparation to the midterm and final exams. Students may work in a group of up to three people and submit one homework per group. Both home assignments must be submitted. No late submissions will be accepted.

## **Examination**

Midterm is a closed book exam. However, students are allowed to use an A4 list with own hand-written notes. There is no possibility to make up the midterm exam. The midterm exam contains the material covered during the first half of the course.

Final exam is a written closed book, closed notes exam. The final exam contains the material covered during the whole course.

The use of unauthorized materials, and receiving and/or providing unauthorized help from/to other students results in a failing grade for the exams.

## **Course outline**

### **Lectures**

*Lecture 1* [W, Ch. 1-4, 6]. Introduction to the course. The nature of econometrics. Types of data. The simple and multiple linear regression model (specification, derivation of OLS estimates, OLS properties, functional form of regression)

*Lecture 2* [W, Ch. 4, W, Ch. C6]. Hypothesis testing. t-test, F-test

*Lecture 3* [W, Ch. 7, 8]. Violations of Gauss-Markov assumptions: Heteroskedasticity, autocorrelation, and multicollinearity. Dummy variables.

*Lecture 4* [CSW, Ch.6]. Testing for endogeneity, overidentifying restrictions, functional form, heteroskedasticity

*Lecture 5* [W., Ch. 9, 16.1-2]. Endogeneity problem and its potential reasons (misspecification, omitted variable, measurement errors, and simultaneity)

*Lecture 6* [W., Ch.9, 15, 16.3]. Solutions to endogeneity problem: proxy variables, IV estimator, 2SLS

*Lecture 7* [G, Ch.14; W, Ch. 16; CSW, Ch.9]. Systems of regression equations. Seemingly unrelated regressions (SUR) Simultaneous Equation Models (identification, estimation, applications to time series and panel data)

MIDTERM EXAM (based on Lectures 1-7)

*Lecture 8* [W, Ch.10-11]. Introduction to time series. Specific features of time series data. Stationarity. Unit root. Testing for unit root

*Lecture 9* [W, Ch. 12; E, Ch.2]. Serial correlation. AR(p), MA(q), ARMA(p,q) models. Box-Jenkins methodology

*Lecture 10* [W, Ch.13, Ch. 17.5]. Introduction to panel data methods. Advantages of having panel data and problems (selectivity and heterogeneity bias). Pooled OLS

*Lecture 11* [W, Ch. 14]. First differencing (FD), Fixed effects (FE) model, random effects (RE) model, Hausman test

*Lecture 12* [W, Ch. 17]. Binary outcome models

*Lecture 13* [CSW, Ch. 15]. Multinomial and ordered models

*Lecture 14* [W, Ch. 17, CSW, Ch. 16]. Censored and Truncated Regression Models.

### **Exercise sessions**

*Ex. session 1.* Introduction to STATA. Estimating linear model with OLS. Hypotheses testing

*Ex. session 2.* Testing for endogeneity, overidentifying restrictions, functional form specification, heteroskedasticity. Correction for heteroskedasticity

*Ex. session 3.* IV and 2SLS estimation

*HW1 deadline*

*Ex. session 4.* Introduction to E-Views. Stationarity. Data transformation. Unit root tests

*Ex. session 5.* SUR and SEM estimation

*Ex. session 6.* Estimation of ARMA models. Box-Jenkins methodology

*Ex. session 7.* FD, FE, RE models estimation, Hausman test

*Ex. session 8.* HW 1 solution

*Ex. session 9.* Binary outcome models estimation

*Ex. session 10-11.* Estimation of multinomial, ordered, censored and truncated regression models

*HW2 deadline*

### **Core reading**

[W] Wooldridge J. (2009). *Introductory Econometrics: A modern approach*. 4th edition, South-Western College Publishing

### **Recommended reading**

[C] Cameron, A. and P. Trivedi (2009). *Microeconometrics Using Stata*, Stata Press

[E] Enders, W. (2009). *Applied Econometric Time Series*, 3d edition, Wiley

[G] Greene W. (2002). *Econometric Analysis*, 5th edition, Prentice Hall

[CSW] Wooldridge, J. (2002). *Econometric Analysis of Cross Section and Panel Data*, MIT Press